Integrated Reaction Wheel Assembly for Spacecraft Attitude Control (GSC-13649-1)

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Technology Opportunity

Objective
The National Aeronautics and Space Administration (NASA) seeks to transfer the Integrated Reaction Wheel Assembly (IRWA) technology to private industry. Developed by Goddard Space Flight Center for science missions, the IRWA offers companies an opportunity to virtually eliminate the technical risk and minimize the financial investment required to introduce a new spacecraft component.

Description
The IRWA was developed for NASA's Small Explorer Lite program - an initiative to provide small, low-cost, high-performance/reliability spacecraft. Designed primarily for small (100 to 1,000 kg) spacecraft launched from a Pegasus-class vehicle, the IRWA provides unique plug-and-play capabilities. The stand-alone assembly contains all necessary power converter, commutation, control, and telemetry electronics. The IRWA can be operated with a current (torque) controller or speed (momentum) controller. Modular interface electronics provide adaptability to any spacecraft computer interface via a standard serial communications interface. Mechanically, the unsealed design reduces the weight and cost associated with complex o-ring seal designs. The flywheel is cantilevered off the motor shaft, enabling the entire rotating assembly to be balanced while fully assembled.

Nominal torque: +/-0.20N-m
Nominal momentum range: +/-8.6N-m-sec
Power: 40 to 80 W peak/6 to 12 W steady state
Weight: 6.4kg
Size: 216x216x102mm
Temperature range: -10 to 40 degree C operating/-20 to 80 degree C survival
Life: 5 years in low Earth orbit

Benefits

- **Plug-and-play:** All electronics, including power converter, commutation, speed monitoring, current control, and telemetry collection are housed within the assembly.
- **Reduced weight:** An unsealed housing reduces weight and complexity.
- **Small size:** The flywheel, motor, and all required electronics are integrated into one small package.
- **Improved bearing performance:** Hybrid ceramic ball/conventional race bearings provide long life, low noise, and low vibration.
- **Easy mounting:** Rectangular casing allows the device to be mounted on three of its six surfaces without intermediate brackets, reducing weight and parts count.
- **Reduced electronics design cost:** The housing's rectangular shape facilitates design of printed circuit boards.
- **Improved low speed accuracy:** An improved tachometer design controls speed to within 3 rpm.
- **Versatile:** Modular interface electronics allow various communication standards to be used, including MIL-STD-1553, RS-485, RS-422, and RS-232. Flight heritage: Builds upon prior technology to be proven on several Small Explorer missions, including the Submillimeter Wave Astronomy Satellite (SWAS),Transition Region & Coronal Explorer (TRACE), and Wide-Field Infrared Explorer (WIRE).

Potential Application(s)
The IRWA is of interest to spacecraft manufacturers and suppliers of spacecraft components. A company could offer the IRWA as a complete product or select components with specific design features to improve other products.

Technology Commercialization Status
This technology is part of NASA's Technology Commercialization program. The program seeks to stimulate the use of NASA-developed technology by the commercial sector. A prototype IRWA has been built and testing is nearing completion. NASA has applied for a patent for IRWA and seeks qualified companies who are interested in pursuing

commercial applications. NASA is flexible in its agreements and opportunities exist through technical consulting, and/or patent licensing (nonexclusive, exclusive field-of-use, or exclusive).

Other Images

- 1001242.gif

Related Technologies

- Small High Torque Reaction Momentum Wheel

Contact
If your company is interested in this technology please contact:

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